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Amended Claims

Serial No. 09/585,472
Docket No. NEC.173

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IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently amended) An active matrix liquid crystal display device, comprising:
a first substrate and a second substrate, at least one of said first substrate and said second substrate being transparent;
a plurality of scanning lines formed on said first substrate;
a plurality of signal lines formed on said first substrate crossing said scanning lines in a matrix manner;
a plurality of thin film transistors, each said thin film transistor respectively formed at an intersection of said scanning lines and said signal lines, each said thin film transistor comprising:
a gate electrode formed on said first substrate;
a gate insulation layer formed on said gate electrode;
a semiconductor layer formed on said gate insulation layer;
a drain electrode formed on a first portion of said semiconductor layer and a first portion of said gate insulation layer; and
a source electrode formed on a second portion of said semiconductor layer and a second portion of said gate insulation layer;
a passivation film formed on said thin film transistors;
at least one color filter formed on said first substrate, a color film forming said at least one color filter additionally covering said passivation film;
a plurality of pixel electrodes, each respectively connected to one of said thin film transistors through a contact hole and each respectively formed on one of said at least one color filter;
a counter electrode formed on said second substrate; and
a liquid crystal layer between said first substrate and said second substrate, said liquid crystal layer being driven by electric fields between said pixel electrodes and said counter electrode to thereby make a display.

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wherein said color filter is formed directly on said first substrate in most of a light transmission region within a pixel area surrounded by said scanning lines and said signal lines, and said passivation film and said color film forms form a stack of layers that reduces a thickness of material of said color filter near said contact hole such that a portion of said passivation film remains in place adjacent to said contact hole.

2. (Previously presented) An active matrix liquid crystal display device, comprising:

a first substrate and a second substrate, at least one of said first substrate and said second substrate being transparent;

a plurality of scanning lines formed on said first substrate;

a plurality of signal lines formed on said first substrate crossing said plurality of scanning lines in a matrix manner;

a plurality of thin film transistors, each said thin film transistor formed at each of intersections of said scanning lines and said signal lines, each said thin film transistor comprising:

a gate electrode formed on said first substrate;

a gate insulation layer formed on said gate electrode;

a semiconductor layer formed on said gate insulation layer;

a drain electrode formed on a first portion of said semiconductor layer and a first portion of said gate insulation layer; and

a source electrode formed on a second portion said semiconductor layer and a second portion of said gate insulation layer;

a passivation film formed on said thin film transistors;

at least one color filter formed on said first substrate;

an overcoat layer formed on each of said at least one color filter;

a plurality of pixel electrodes, each respectively connected to one of said thin film transistors through a contact hole;

a counter electrode formed on said second substrate; and

a liquid crystal layer between said first substrate and said second substrate, said liquid

~~crystal layer being driven by an electric field between said pixel electrodes and said counter electrode to thereby make a display,~~

~~wherein said at least one color filter is formed directly on said first substrate in most of a light transmission region within a pixel area surrounded by said scanning lines and said signal lines, said passivation film, said color filter, and said overcoat layer are formed as a stack of layers that reduces a thickness of material of said color filter near said contact hole such that a portion of said passivation film remains in place adjacent to said contact hole, and~~

~~said pixel electrodes are formed on said overcoat layer.~~

3. (Previously presented) An active matrix liquid crystal display device according to claim 1, wherein the color filter around said contact hole is thinner than the color filter in said light transmission region.
4. (Previously presented) An active matrix liquid crystal display device according to claim 1, wherein said color filter comprises an organic film, a difference in level generated on a surface of the organic film being not more than 0.3 μm .
5. (Previously presented) An active matrix liquid crystal display device according to claim 1, wherein said color filter comprises a photosensitive acrylic resin having a pigment dispersion property.

6. (Currently amended) A method of manufacturing an active matrix liquid display device, the method comprising:

forming a plurality of scanning lines on a first substrate;

forming a plurality of signal lines crossing the plurality of scanning lines in a matrix

manner;

forming a plurality of thin film transistors, each respectively located at intersections of the plurality of scanning lines and the plurality of signal lines, each said thin film transistor comprising:

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a gate electrode formed on said first substrate;
a gate insulation layer formed on said gate electrode;
a semiconductor layer formed on said gate insulation layer;
a drain electrode formed on a first portion of said semiconductor layer and a first portion of said gate insulation layer; and

a source electrode formed on a second portion of said semiconductor layer and a second portion of said gate insulation layer;

forming pixel electrodes respectively connected to each of said thin film transistors;

forming a counter electrode on a second substrate;

injecting a liquid crystal between said first substrate and said second substrate and sealing the liquid crystal,

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wherein said method further comprises:

forming a passivation film to protect each of said thin film transistors;

removing part of a gate insulating layer and said passivation film of each of said thin film transistors in a region surrounded by said signal lines and said scanning lines;

forming a color filter comprising a photosensitive color resist;

forming a contact hole in said color filter and said passivation film on each of said thin film transistors in a location so that a portion of said passivation film remains between said contact hole and said color filter to reduce a thickness of said color filter material adjacent to said contact hole; and

forming a plurality of pixel electrodes, each comprising a transparent conductive film electrically connected through said contact hole.

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7. (Currently Amended) A method of manufacturing an active matrix liquid crystal display, the method comprising:

forming a plurality of scanning lines on a first substrate;

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forming a plurality of signal lines crossing the plurality of scanning lines in a matrix manner;

forming a plurality of thin film transistors, each respectively located at intersections of the plurality of scanning lines and the plurality of signal lines, each said thin-film transistor comprising:

a gate electrode formed on said first substrate;
a gate insulation layer formed on said gate electrode;
a semiconductor layer formed on said gate insulation layer;
a drain electrode formed on a first portion of said semiconductor layer and a first portion of said gate insulation layer; and

a source electrode formed on a second portion of said semiconductor layer and a second portion of said gate insulation layer;

forming a pixel electrode connected to each said thin film transistors;

forming a counter electrode on a second substrate;

injecting a liquid crystal between said first substrate and said second substrate and sealing the liquid crystal;

wherein said method further comprises:

forming a passivation film to protect each of said thin film transistors;

removing part of a gate insulating layer and said passivation film of each of said thin film transistors in a region surrounded by said signal lines and said scanning lines;

forming a color filter comprising a photosensitive color resist;

forming an overcoat layer on said color filter;

patterning said overcoat layer;

forming a contact hole by patterning said color filter while using said overcoat layer as a mask, said contact hole formed so as to leave a portion of said passivation layer between said contact hole and said color filter; and

forming a plurality of pixel electrodes, each said pixel electrode comprising a transparent conductive film electrically connected through said contact hole.

8. (Previously presented) An active matrix liquid crystal display device according to claim 2, wherein the color filter around said contact hole is thinner than the color filter in said light

transmission region.

9. (Previously presented) An active matrix-liquid crystal display device according to claim 2, wherein said color filter comprises an organic film, a difference in level generated on a surface of the organic film being not more than 0.3 μ m.

10. (Previously presented) An active matrix liquid crystal display device according to claim 2, wherein said color filter comprises a photosensitive acrylic resin having a pigment dispersion property.

11. (Previously presented) An active matrix liquid crystal display device, including:
a plurality of pixels, each of said pixels comprising:
a transistor;
a passivation film formed to cover said transistor, said passivation film having a first hole exposing an electrode of said transistor and a pixel opening, said first hole formed in a location such that a portion of said passivation film remains between said first hole and said pixel opening;
a color filter formed to fill said pixel opening of said passivation film, said color filter having a second hole; and
a pixel electrode formed to cover said color filter and to be connected to the electrode of said transistor through said first and second holes.

12. (Previously presented) The device as claimed in claim 11, wherein said color filter has a substantially flat surface so that a first portion of said color filter filling said pixel opening is larger in thickness than a second portion of said color filter covering said passivation film.

13. (Previously presented) The device as claimed in claim 12, wherein said transistor includes a gate insulating film, said gate insulating film having a third hole that is formed correspondingly to

said pixel opening of said passivation film and is filled with said color filter.

14. (Previously presented) The device as claimed in claim 12, wherein said color filter is extended to cover said transistor with an intervention of said passivation film.

15. (Previously presented) ~~The device as claimed in claim 12, wherein each of said pixels further comprises an overcoat layer inserted between said color filter and said pixel electrode.~~

16. (Previously presented) The device as claimed in claim 12, wherein each of said pixels further comprises a signal line connected to said transistor, said color filter provided for one of said pixels being extended to and terminated on the signal line connected to an adjacent one of said pixels with an intervention of a part of said passivation film.

17. (Previously presented) A method of manufacturing an active matrix liquid crystal display device, the method comprising:

forming a plurality of pixels, said forming of said plurality of pixels comprising, for each of said pixels:

providing a transistor;

forming a passivation film to cover said transistor;

forming a first hole in said passivation film exposing an electrode of said transistor and a pixel opening, said first hole formed so as to leave a portion of said passivation film between said first hole and said pixel opening;

forming a color filter to fill said pixel opening of said passivation film, said color filter having a second hole; and

forming a pixel electrode to cover said color filter and connect to the electrode of said transistor through said first and second holes.

18. (Previously presented) The method as claimed in claim 17, wherein said color filter has a substantially flat surface so that a first portion of said color filter filling said pixel opening is larger in thickness than a second portion of said color filter covering said passivation film.

19. (Previously presented) The method as claimed in claim 18, wherein said transistor includes a gate insulating film, said gate insulating film having a third hole that is formed correspondingly to said pixel opening of said passivation film and is filled with said color filter.

20. (Previously presented) The method as claimed in claim 18, wherein said color filter is extended to cover said transistor with an intervention of said passivation film.

21. (Previously presented) ~~The method as claimed in claim 18, further comprising, for each of said pixels, inserting an overcoat layer between said color filter and said pixel electrode.~~

22. (Previously presented) The method as claimed in claim 18, further comprising, for each of said pixels, providing a signal line connected to said transistor, said color filter provided for one of said pixels being extended to and terminated on the signal line connected to an adjacent one of said pixels with an intervention of a part of said passivation film.